Date: Tue, 7 Sep 93 04:30:16 PDT
From: Ham-Ant Mailing List and Newsgroup <ham-ant@ucsd.edu>
Errors-To: Ham-Ant-Errors@UCSD.Edu
Reply-To: Ham-Ant@UCSD.Edu
Precedence: Bulk
Subject: Ham-Ant Digest V93 #39
To: Ham-Ant

Ham-Ant Digest   Tue, 7 Sep 93   Volume 93 : Issue   39

Today's Topics:
                     Dual Band VHF/UHF antenna

Send Replies or notes for publication to: <Ham-Ant@UCSD.Edu>
Send subscription requests to: <Ham-Ant-REQUEST@UCSD.Edu>
Problems you can't solve otherwise to brian@ucsd.edu.

Archives of past issues of the Ham-Ant Digest are available
(by FTP only) from UCSD.Edu in directory "mailarchives/ham-ant".

Date: 6 Sep 93 15:04:53 GMT
From: mcsun!julienas!laas!gimli.laas.fr!user@uunet.uu.net
Subject: Dual Band VHF/UHF antenna
To: ham-ant@ucsd.edu

Dear om,
I am looking for a scheme of a vertical dual band antenna (144MHz and
430MHz).
I want to put at a window of my flat, so I whish a small height (1.5meter)
and little radiants (or a cavity like a VHF top craze antenna).
If you have an idea, thank you for give me informations.
Thanks very much and 73's,
Nicolas

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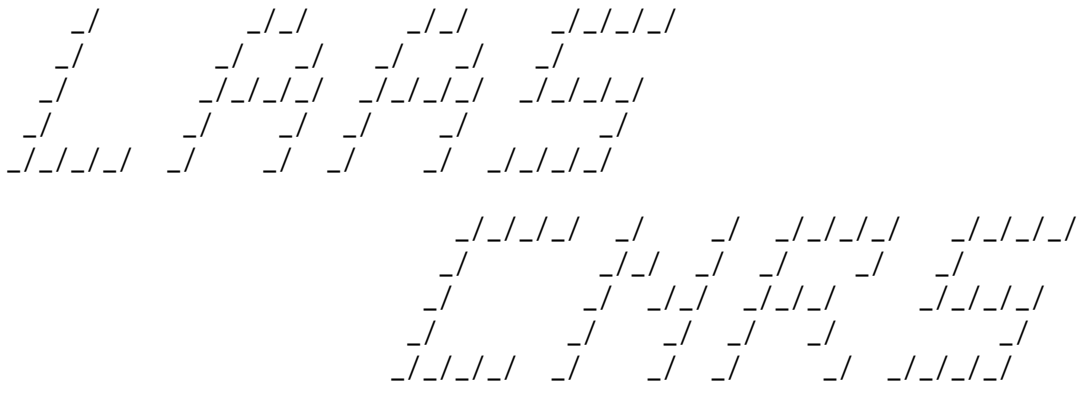


Date: 6 Sep 1993 14:50:25 GMT
From: usc!howland.reston.ans.net!darwin.sura.net!news-feed-2.peachnet.edu!concert!quad.wfunet.wfu.edu!matthews@network.ucsd.edu
To: ham-ant@ucsd.edu

References <2690ab$a3e@news.delphi.com>, <26bj4h$4un@quad.wfunet.wfu.edu>, <26dnn3$ba2@news.delphi.com>ews
Subject : Re: G5RV

CECILMOORE@DELPHI.COM (cecilmoo@news.delphi.com) wrote:
: Rick, there's only one way for an SWR on a transmission line to go
: from being "outrageous on the twin-lead side" to being acceptable
: at the other end of a G5RV and that is losses.

There are many lossless (more precisely, very low loss) ways to go from high-SWR on the twin-lead side to a 1:1 on the coax side. I don't know what's in the white plastic tube on the G5RV, but I assume that they have used one of these.

This is what an antenna tuner does, after all. It transforms a piece of coax, ladder line, etc. from the antenna with high SWR and representing anything but a 50 ohm impedance into 50 ohm coax with an SWR of 1:1. Dial in the right capacitance and inductance and your in business. Tuners do not work on loss. Tuners would get very hot were they to rely on I squared R for matching.

A very simple way to transform impedances is to use a short section of transmission line of a different impedance. There will be high-SWR on that section, but if the section is short and low-loss (like the twin-lead of the G5RV), then there is the power loss is relatively small. That is what the twin-lead on the G5RV is doing. It is not a random-length.

It is even possible for a ideal lossless section of transmission line

of a differing impedance to transform a non-resonant non-50-ohm
antenna into an impedance of 50 ohm. All without losses.

: Here's a quote from the
: ARRL Antenna Handbook: "...a line terminated in a short or open circuit
: (infinite SWR), and having an attenuation of 15db, would exhibit an SWR
: of only 1.05 at its input." Just because you read an acceptable SWR at
: the transceiver end doesn't mean that the antenna is doing a good job.

Agreed. But the question is, what impedance does the white plastic
tube present to the coax in the G5RV? If it is close to 50 ohms, then
the coax losses will be minimal.

: My calculations indicate that a G5RV loses more than half of the
: transmitted power in the RG-59 coax at 21.35MHz. If I didn't make a
: mistake
: in my calculations, you are looking into 18-j156 at the G5RV balun on
: 21.35 MHz. and that's an SWR of 35 for a 50 ohm line. I think the major
: cause of global warming is the heat dissapated in G5RVs all over the world.

Is 18-j156 what the balun sees or what the coax sees looking into the
balun? I assume from the above that you included the impedance matching
effects of the twin-lead in you modeling. Could you tell me how you
modeled the balun and whether you know your representation of it is
accurate? If the impedance on the coax side is as you calculated,
that's a good reason to find an alternative to G5RV, particularly on 15m where
dipoles are small.

The one band where I really need the G5RV is 75m. I have room for
full size dipoles on other bands and plan on putting them up
eventually. Your calculations may help me define "eventually".

73's.
WA4GSP

--
Rick Matthews   matthews@wfunet.wfu.edu
Wake Forest University   919-759-5340   (Voice)
Winston-Salem, NC 27109-7507   919-759-6142   (FAX)

Date: 6 Sep 1993 13:29:20 -0400
From: usc!howland.reston.ans.net!noc.near.net!news.delphi.com!news.delphi.com!not-for-mail@network.ucsd.edu
To: ham-ant@ucsd.edu

References <26bj4h$4un@quad.wfunet.wfu.edu>, <26dnn3$ba2@news.delphi.com>,

<26finh$8fj@quad.wfunet.wfu.edu>
Subject : Re: G5RV

>I don't know what's in the white plastic tube on the G5RV...

The white plastic tube is either a 1/1 balun or nothing at all.

>This is what an antenna tuner does, after all...

Antenna tuners DO NOT change the SWR in the transmission line. They simply try to change an x +jy impedence to what will make the transmitter happy.

>A very simple way to transform impedances is to use a short section
>of transmission line of a different impedance. That is what the
>twin-lead on the G5RV is doing.

The twin-lead is indeed transforming the antenna impedence according to the laws of physics, not magic. The G5RV does not transform any antenna impedence on any band to anywhere close to 50 ohms. The twin-lead is not where the losses are... the losses are in the coax.

>But the question is, what impedance does the white plastic
>tube present to the coax in the G5RV? If it is close to 50 ohms,
>then the coax losses will be minimal.

Here's my calculations: 102' G5RV Analysis Using ELNEC

A 102 ft. center-fed #14 wire antenna 30 ft. above real ground has the following feed point impedences according to ELNEC:

3.9 MHz	17-j284	18.14 MHz	2139+j1588
7.2 MHz	598+j1429	21.35 MHz	201-j961
10.12 MHz	1297-j2117	24.95 MHz	206+j324
14.25 MHz	128-j24	28.4 MHz	928-j1546

A 26.75 ft. 300 ohm twin-lead (0.82 VF) "matching section" transforms the above impedences to:

3.9 MHz	9-j0	18.14 MHz	90-j450
7.2 MHz	24-j75	21.35 MHz	18-j256
10.12 MHz	30+j219	24.95 MHz	336+j456

14.25 MHz   135-j78   28.4 MHz   255+j870

You can assume a 1/1 Balun or nothing at all.
These impedences are what the 50 ohm coax transmission line sees
and the resultant SWR is > 20 on 10.12, 18.14, 21.35, 24.95, and
28.4 MHz. The calculated SWR is 5.7 on 3.9 MHz, 7.2 on 7.2 MHz,
and 3.8 on 14.25 MHz which, I admit, is not too bad.

I could have made some mistakes using the Smith Chart. Please feel
free to check my results.

The moral of the story is: Throw away your lossey coax and bring
ladder-line directly to the balanced output of an antenna tuner.
You will radiate a lot more power. I have been told that one "S"
unit doesn't matter but I beleive it does going from 1 to 2 on
weak-signal CW.

ELNEC is an antenna analysis program available from Roy Lewallen,
W7EL, P.O.Box 6658, Beaverton, OR 97007. A Smith Chart was used
to determine the transformed impedences.

73, KG7BK

Date: 6 Sep 1993 17:57:11 GMT
From: usc!howland.reston.ans.net!vixen.cso.uiuc.edu!moe.ksu.ksu.edu!
crcnis1.unl.edu!unlinfo!mcduffie@network.ucsd.edu
To: ham-ant@ucsd.edu

References <CCrx1y.2J3@news.udel.edu>,
<1993Sep3.144406.18057@newsgate.sps.mot.com>,
<1993Sep5.211244.6404@b17news.b17a.ingr.com>
Subject : Re: Multiband Hustler on Ford Aerostar?

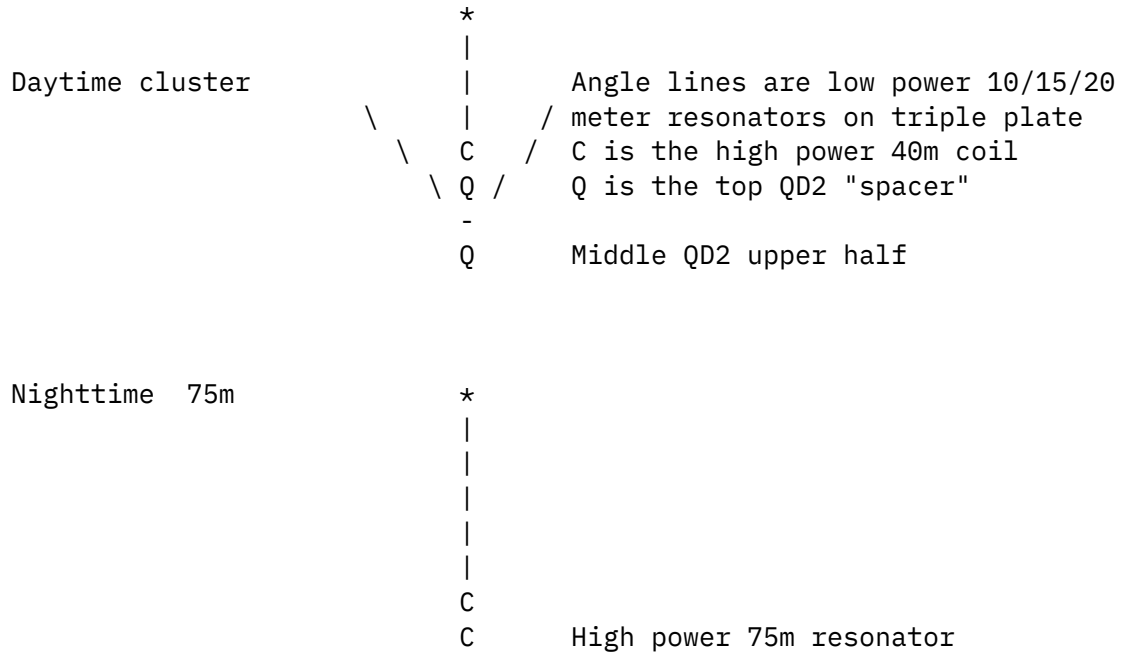
Why go to all that trouble? I run a Hustler with 4 resonators on a mag
mount on my Aerostar. It's a VanGordon "Four-Footer" (number of feet,
not size) and holds very well. Use the short base mast with a QD2 at
the junction of the mast and the base spring (heaviest I could find)
and a heavy-duty resonator spring at the top of the mast with another
QD2 above that. For 75m, the high power resonator is snapped on the top
of the mast with the QD2. For daytime travel, the 75m resonator comes
off and the 4 band cluster is snapped on. The 4 band cluster is made
up of (from bottom up), the other half of a QD2 to mate with the one at
the top of the mast above the spring, a triple resonator plate (angles
3 resonators away from the center, another QD2 mounted straight up the

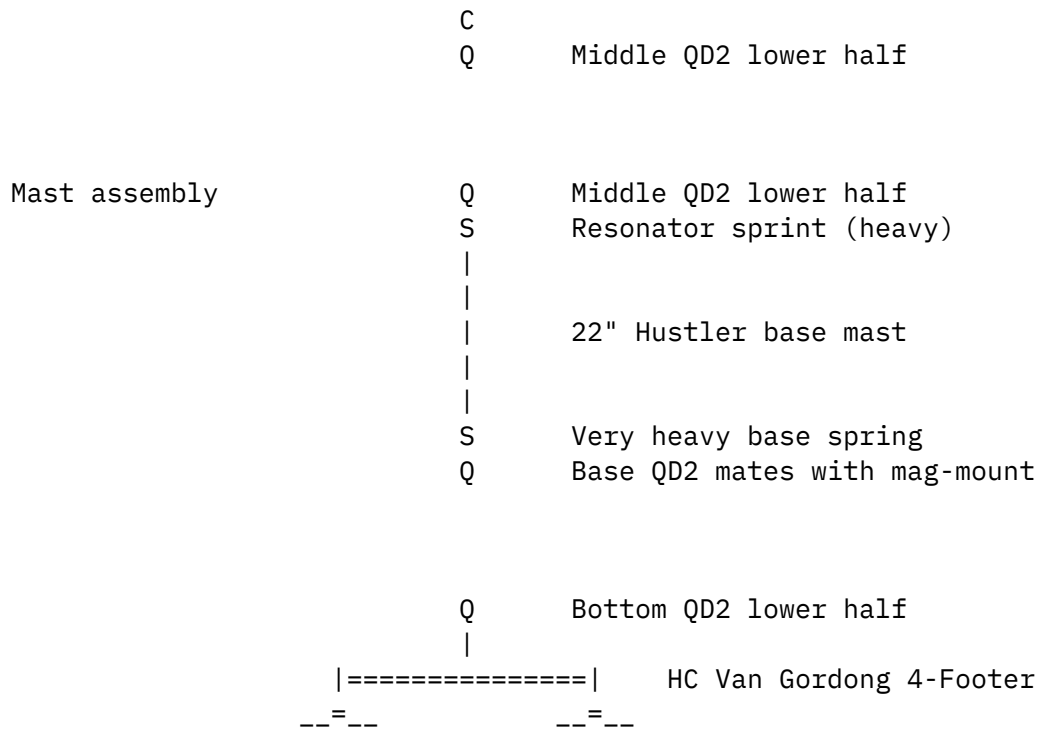
middle, above the triple plate, and the 40m resonator in the middle. Use lower power resonators for the triple plate (10-15-20). The third QD2 at the base of the 40m high power resonator is to get bandwidth back. Without it, it's too close to the other resonators in the cluster and the 1.5:1 bandwidth is about 2khz. With the QD2 acting as an extension, the bandwidth is back to 35khz or so. The base mast will only lean at 70mph or more with either day or night configuration. The 75m resonator leans only slightly at speed and the 4 band cluster leans only slightly more. Total lean of the whole thing is probably about 20 degrees at the top tip. By the way, the mag mount fits well between rails of the roof rack and the roof makes a good launching point for your signal. The whole thing works well and I use the built-in tuner to make it work on 12/17 meters.

This antenna has withstood estimated 90mph winds in the daytime configuration (worst case). The vehicle speed was 65 with very strong headwinds coming back from Dayton. It took a whole day of that without a problem. Who knows what forces are there when a truck goes by in the opposite direction.

A word of warning, don't use one of the cheap mag mounts. The four footer is $100 bucks and does the job. The one that was used in a recent magazine article would never do the job with this antenna. It may work okay for a hamstick but not for something this heavy. You would be in court in no time, arguing who was going to pay for damage your antenna caused when it went throught the windshield behind you.

I'm not good at ascii pictures but will try to include something.





I hope this make some sense. It works well

73 and good luck,
Gary - AG0N@AG0N.#WNE.NE.USA.NA
ag0n@unl.edu

Date: 7 Sep 1993 01:58:35 GMT
From: haven.umd.edu!darwin.sura.net!news-feed-2.peachnet.edu!concert!
quad.wfunet.wfu.edu!matthews@ames.arpa
To: ham-ant@ucsd.edu

References <26dnn3$ba2@news.delphi.com>, <26finh$8fj@quad.wfunet.wfu.edu>,
<26fs1g$afc@news.delphi.com>
Subject : Re: G5RV

The impedances you quote certainly don't lend themselves to being
all transformed to 50 ohms with ANY single balun, 1:1 or otherwise, so
you have proven your point about the high SWR, even though we don't
know what's in the white plastic tube. Thanks for enlightening me.
New dipoles to go up soon....

I would like for you to reconsider your following comment:

: Antenna tuners DO NOT change the SWR in the transmission line. They
: simply try to change an x +jy impedance to what will make the trans-
: mitter happy.

Antenna tuners do not change the SWR in the transmission line between the tuner and the antenna. The DO change the SWR in the transmission line between the tuner and the transmitter (to 1:1 when properly adjusted), which was my point. One can design devices that couple an arbitrary impedance antenna into 50 ohm coax so that the SWR on the transmission line is 1:1.

I doubt anything so fancy is in the white plastic tube (the whole antenna is inexpensive), so it may not be relevant to the G5RV. In principle, however, one could build something that looked just like a G5RV but which had appropriate frequency selective matching circuitry in the white plastic tube. (It would probably need to be bigger and heavier, though.)

Thanks for the G5RV calculations.

73, WA4GSP

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End of Ham-Ant Digest V93 #39
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